Rod and Transit Surveys Along the Western Shoreline of Cook Inlet
Lake Clark National Park & Preserve:
A Look at Ten Years of Change

Joel Cusick
GIS Specialist
Alaska Regional Office

Objectives

- Coastal Lake Clark Classification
- Beach Profile Methods
- Key Findings
- Future Recommendations

Introduction

- Marine shoreline of coastal Lake Clark is dynamic, high energy estuarine environment

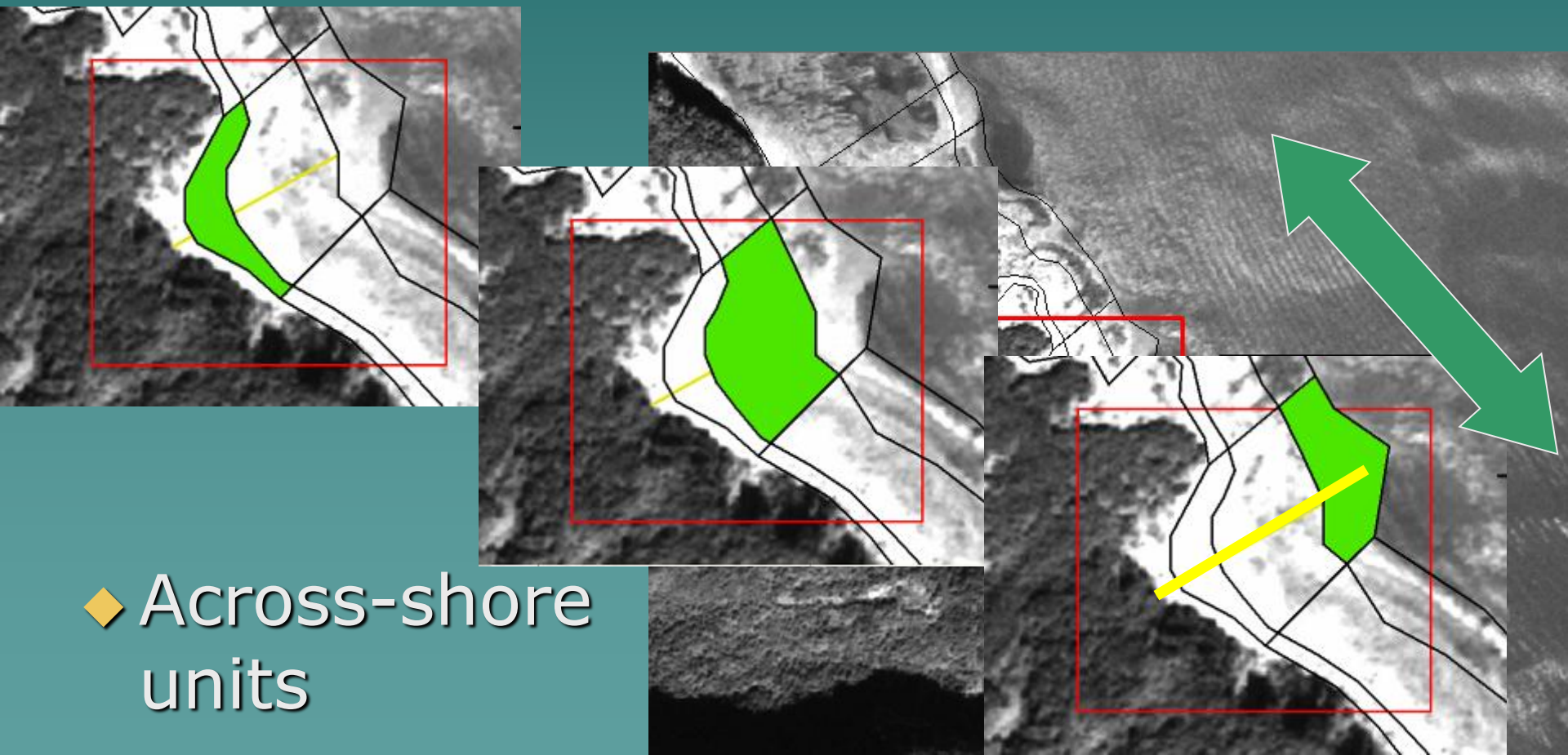
LACL Shoreline Classification

- 1992; 1994 – 1995
- 138 km of shoreline were classified (Schoch, 1999)
  - Wave Power
  - Shore Dynamism
  - Wave Runup
  - Percent Slope
  - Intertidal Transects
  - Beach Profile Transects

Schoch, C., 1999: Classification of Nearshore Habitats: A Spatial Distribution Model. M.Sc. Thesis, Oregon State Univ., 146pp.

LACL Shoreline Classification

- Alongshore segments



- Across-shore units

Objectives

- Coastal Lake Clark Classification
- Beach Profile Methods
- Key Findings
- Future Recommendations

Study Overview

Beach Profile Methods

- Rod and Transit (Level) Surveys
  - Surface elevations directly measured along a draped tape to waterline

Beach Profile Methods

- Find Temporary Bench Mark (TBM)
  - 10-12yr photos, metal detector
  - > 1 hour searching

Beach Profile Methods

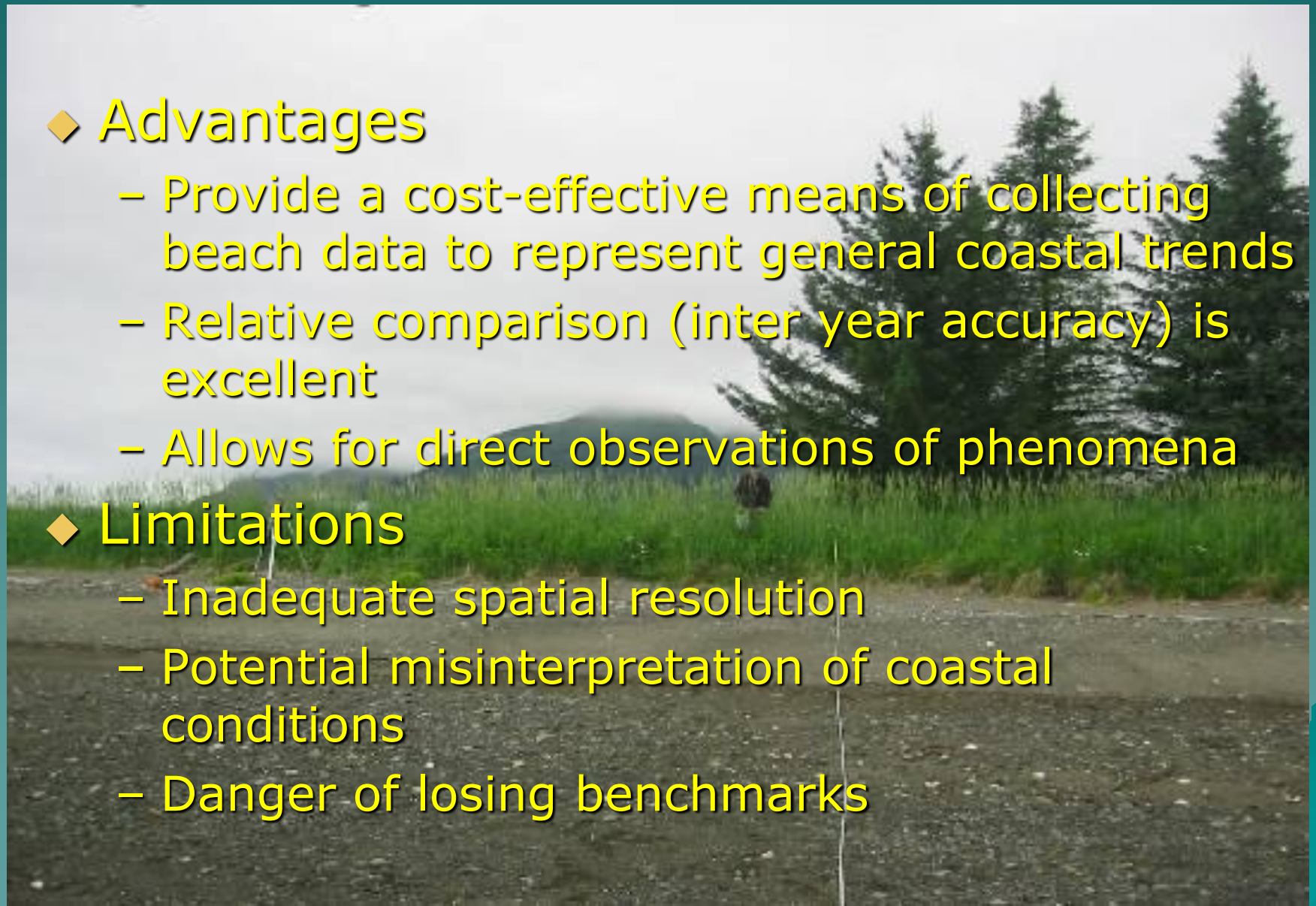
- TBM position recorded with mapping Grade GPS
- Elevations and distance along tape recorded
- Significance: 0.1ft
- Sampling at elev/substrate breaks
- Rod holder progresses seaward

+/- 50 cm

Beach Profile Methods

- Two-dimensional cross-shore profiles
- Graphs generated in Excel
  - Assumed elevation of TBM in feet above MLLW
  - Elevations determined from local tide gauge predictions

Beach Profile Methods



- Advantages
  - Provide a cost-effective means of collecting beach data to represent general coastal trends
  - Relative comparison (inter year accuracy) is excellent
  - Allows for direct observations of phenomena
- Limitations
  - Inadequate spatial resolution
  - Potential misinterpretation of coastal conditions
  - Danger of losing benchmarks

Objectives

- Coastal Lake Clark Classification
- Beach Profile Methods
- Key Findings
- Future Recommendations

Key Findings

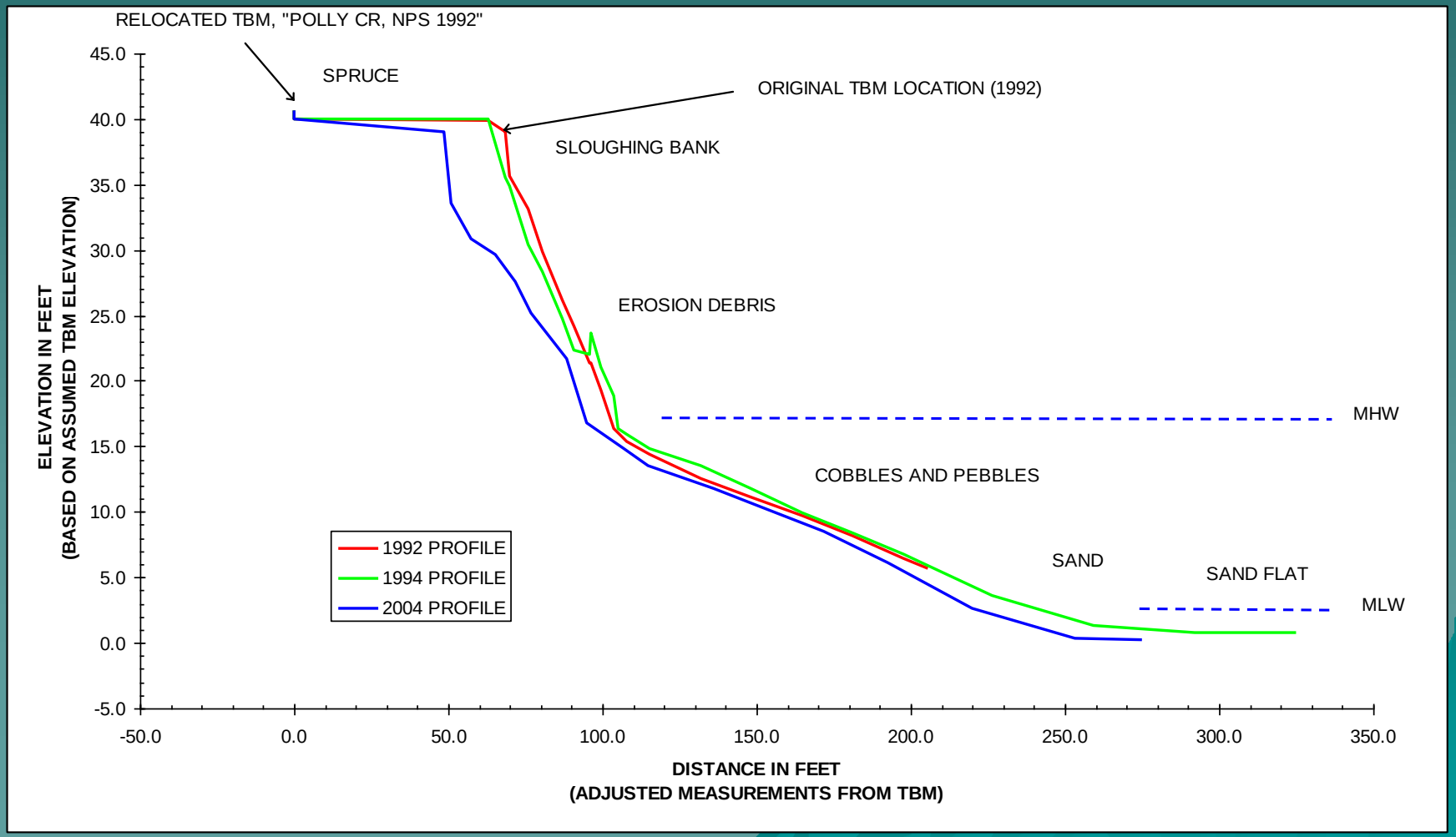
Polly Creek


Polly Creek - Overview of Site. Transect in center of phot2004 Beach Profiles - Coastal LACL
N 60° 15' 38.3" W 152° 30' 49.9" 151 ft NAD 83 W
07/01/2004 7:08:22 PM


Polly Creek - Alan on eroded bluff.
2004 Beach Profiles - Coastal LACL
N 60° 15' 41.2" W 152° 31' 00.2" 52 ft NAD 83 N
07/01/2004 8:42:32 PM

Polly Creek

- Bluff erosion – 0.6m / yr
- Risk of losing temporary benchmark

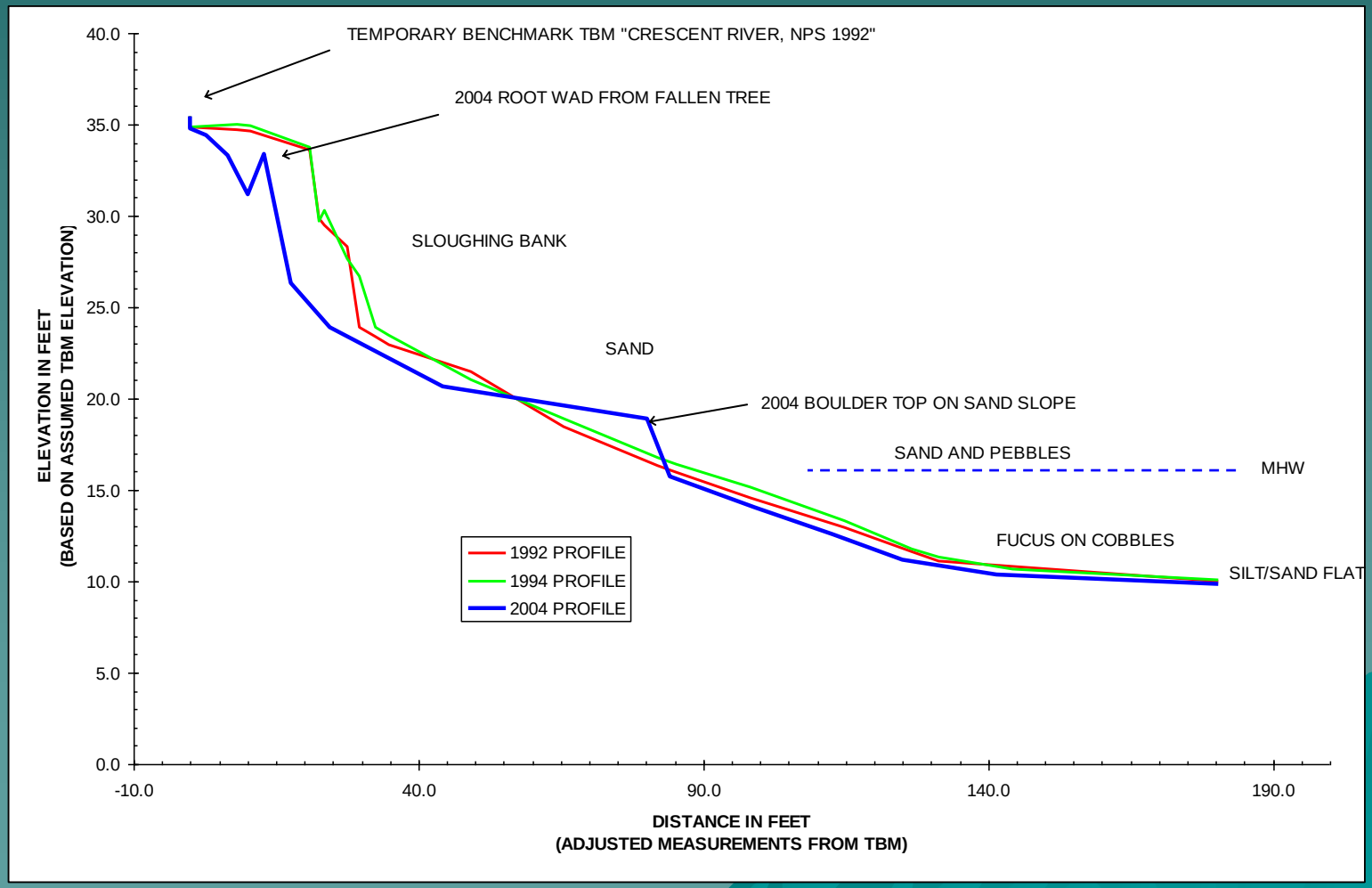


Key Findings

Crescent River

Crescent River

- Bluff erosion – 0.6m / yr
- Risk of losing temporary benchmark

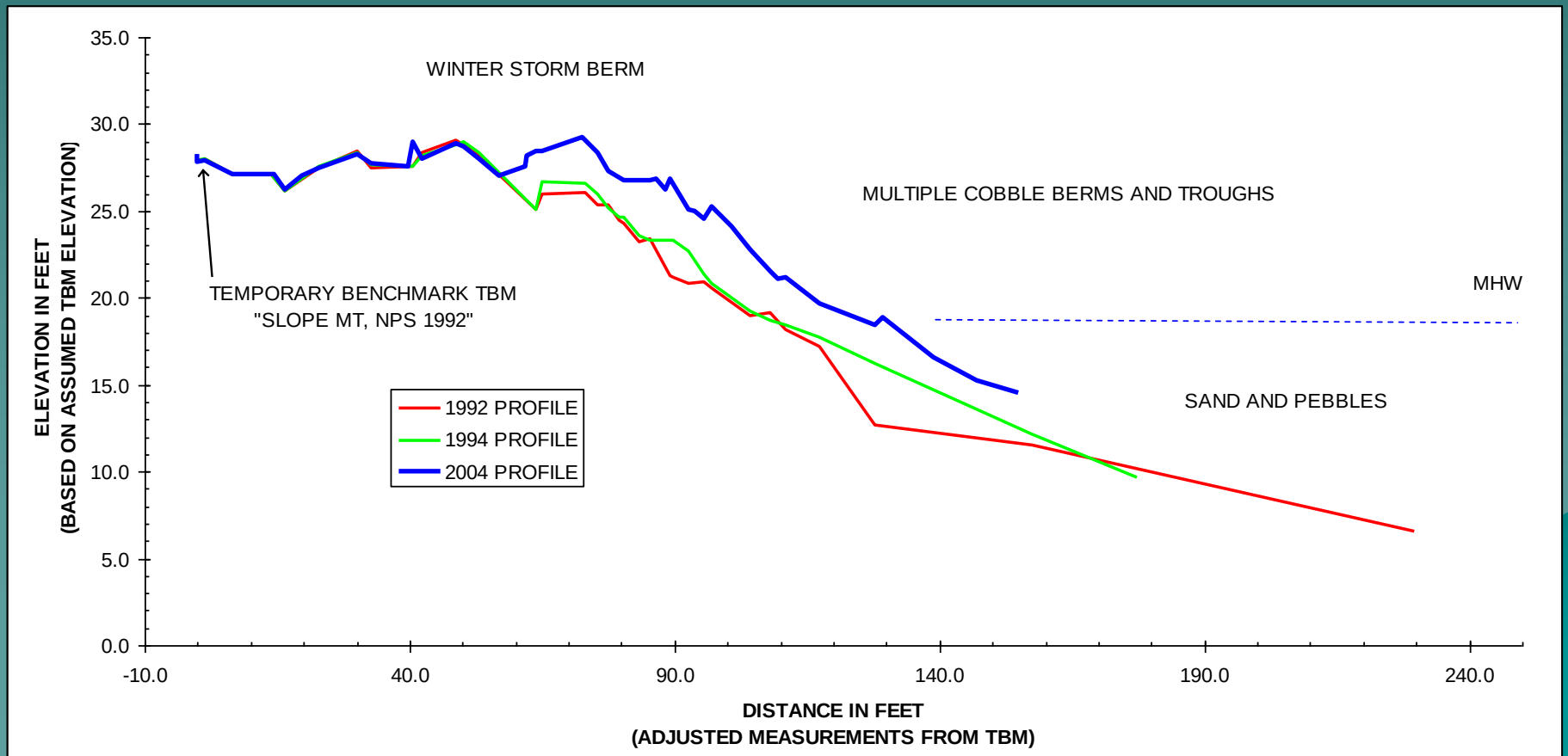


Key Findings

Slope Mountain

Slope Mountain

- Accretion ~ 1- 2 meters
- Stable backshore
- Landslide risks

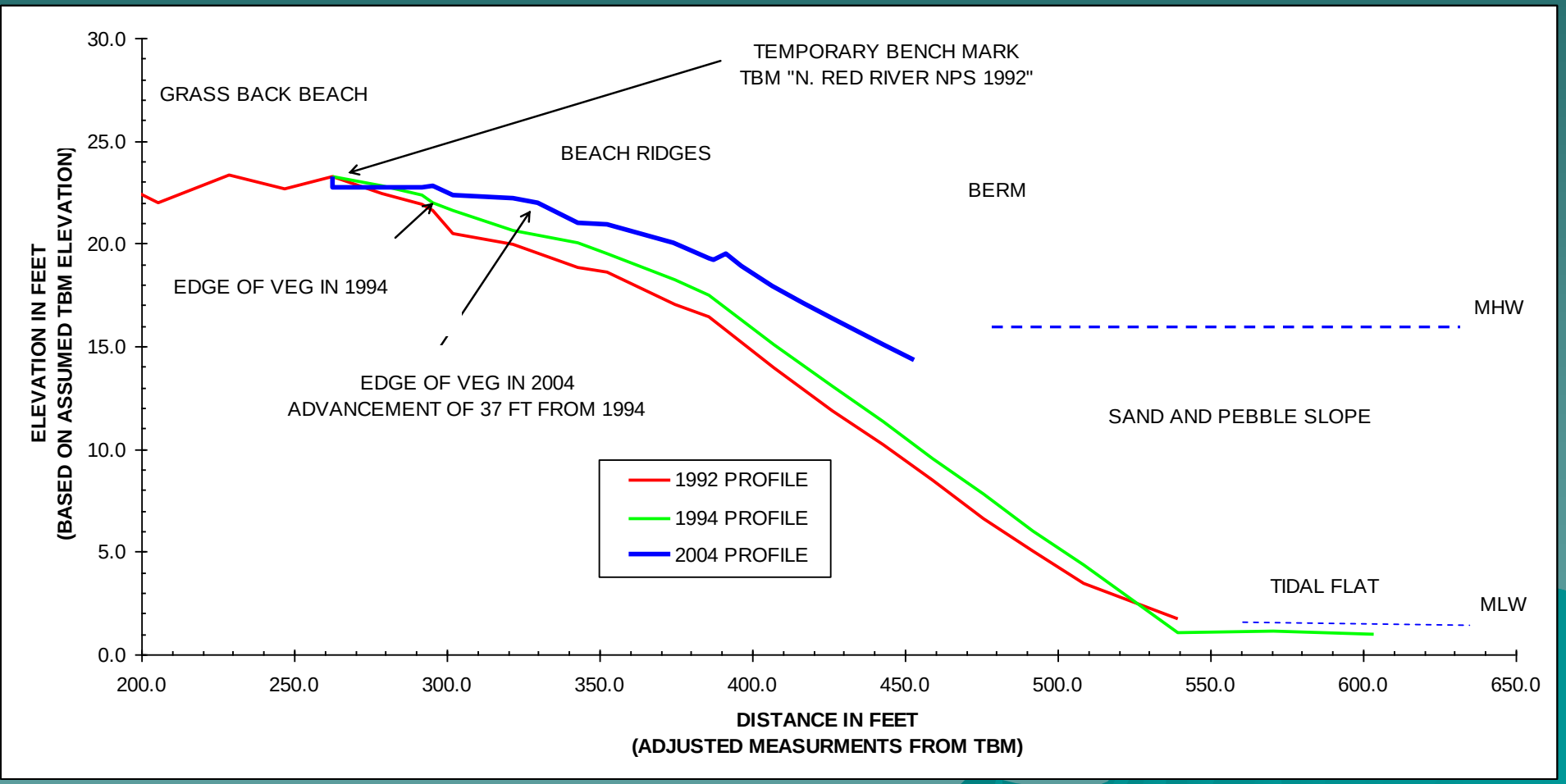


Key Findings

Silver Salmon

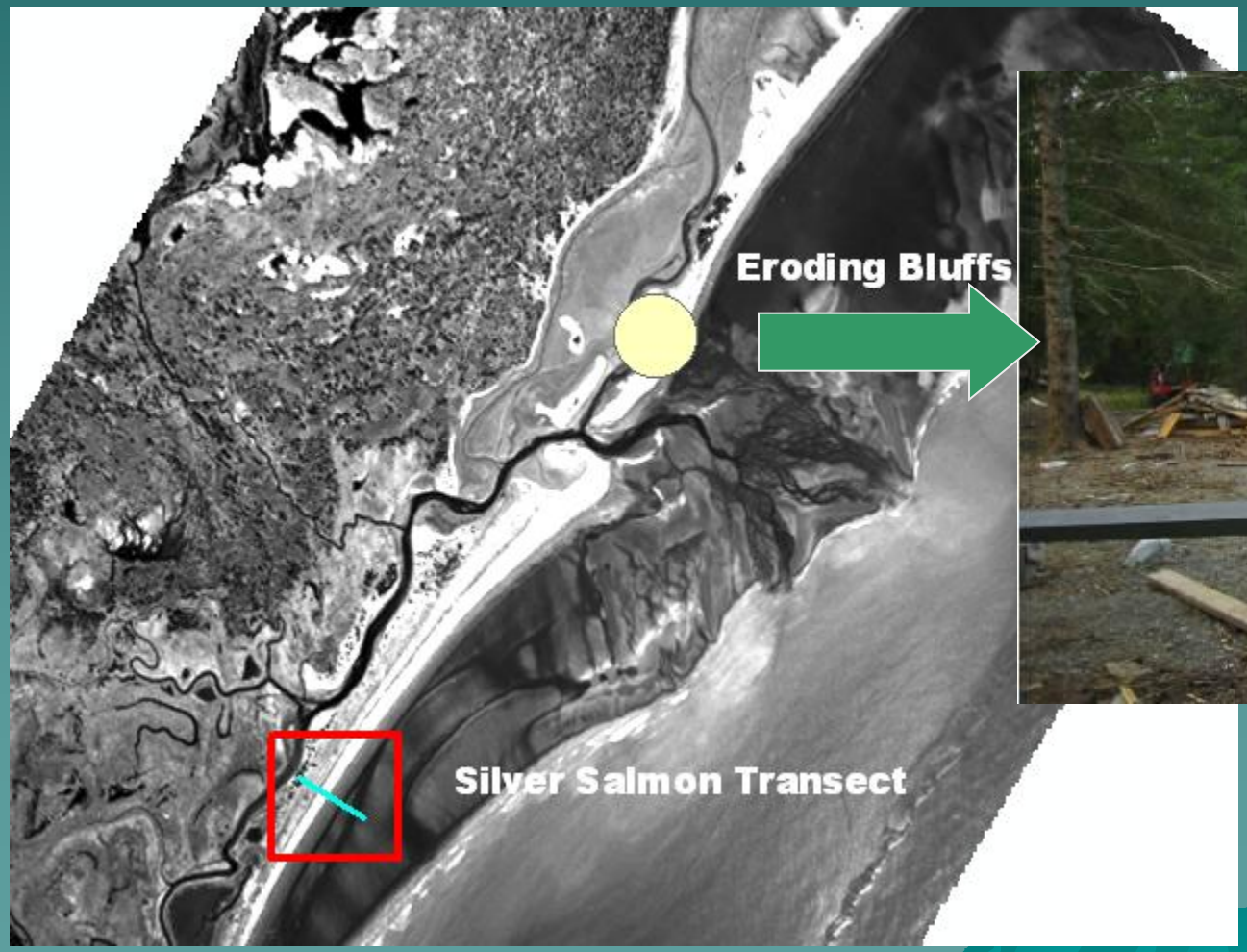
- Oceanward vegetation advancement of 11m
- Accretion in upper to lower intertidal

Silver Salmon



Silver Salmon

- Eroding Bluffs at mouth of River, 2.5km to the NE



Key Findings

Spring Point and Clam Point

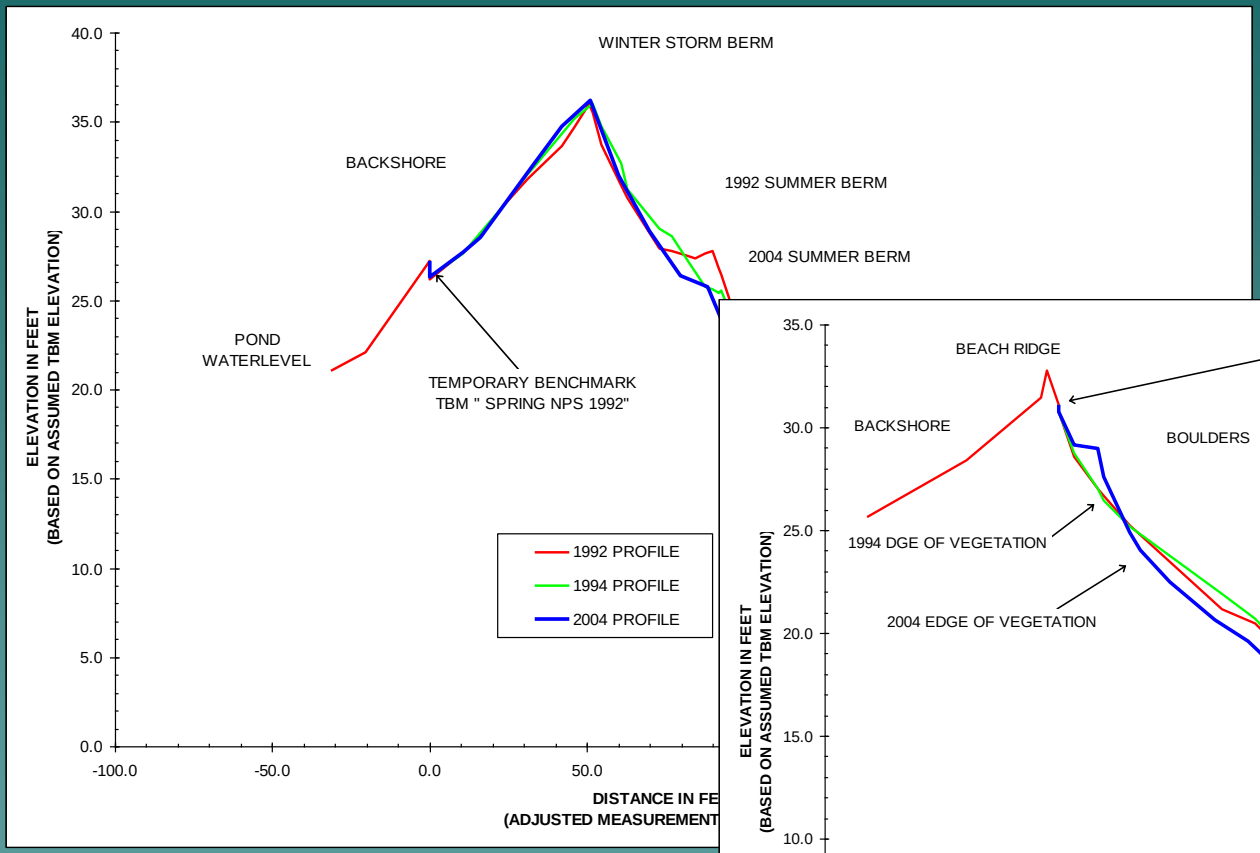
- Spring Point

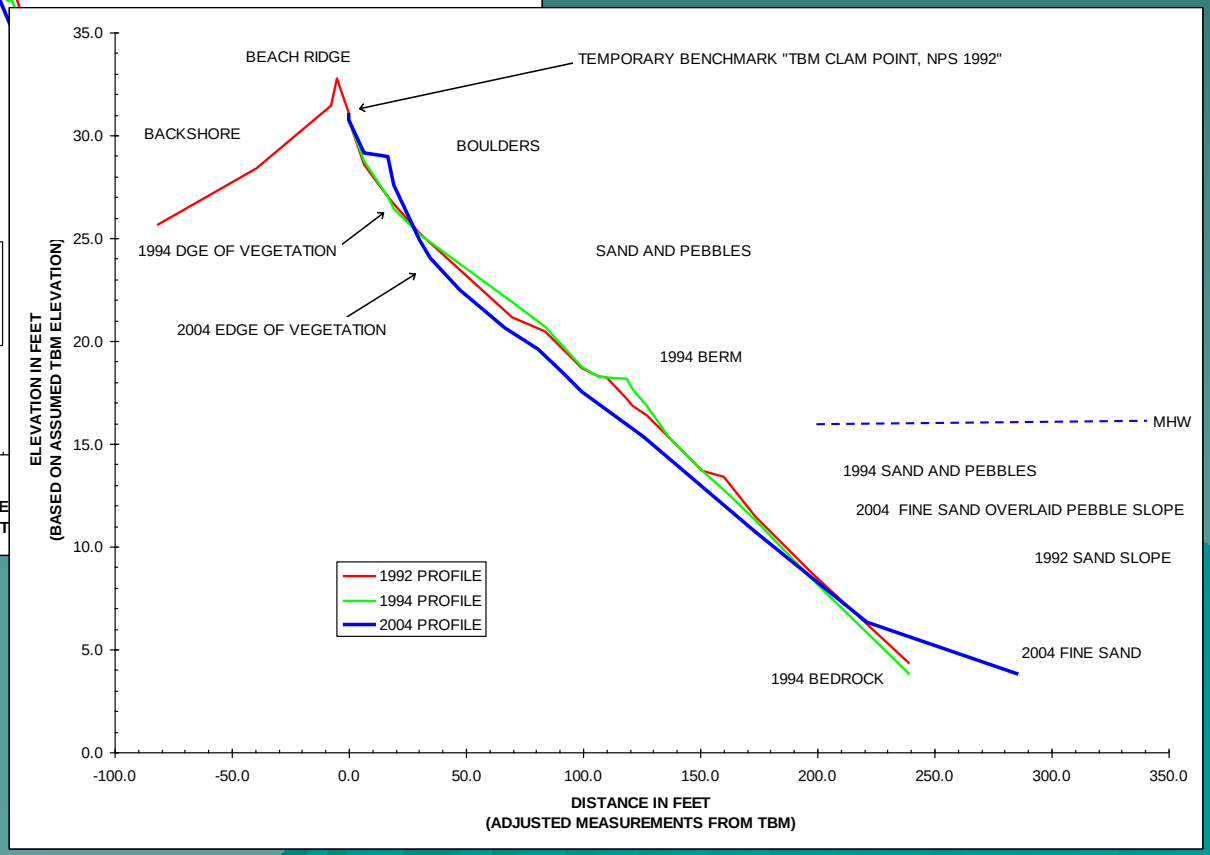
Spring Point and Clam Point

- Clam Point

Spring Point and Clam Point

- Little Change



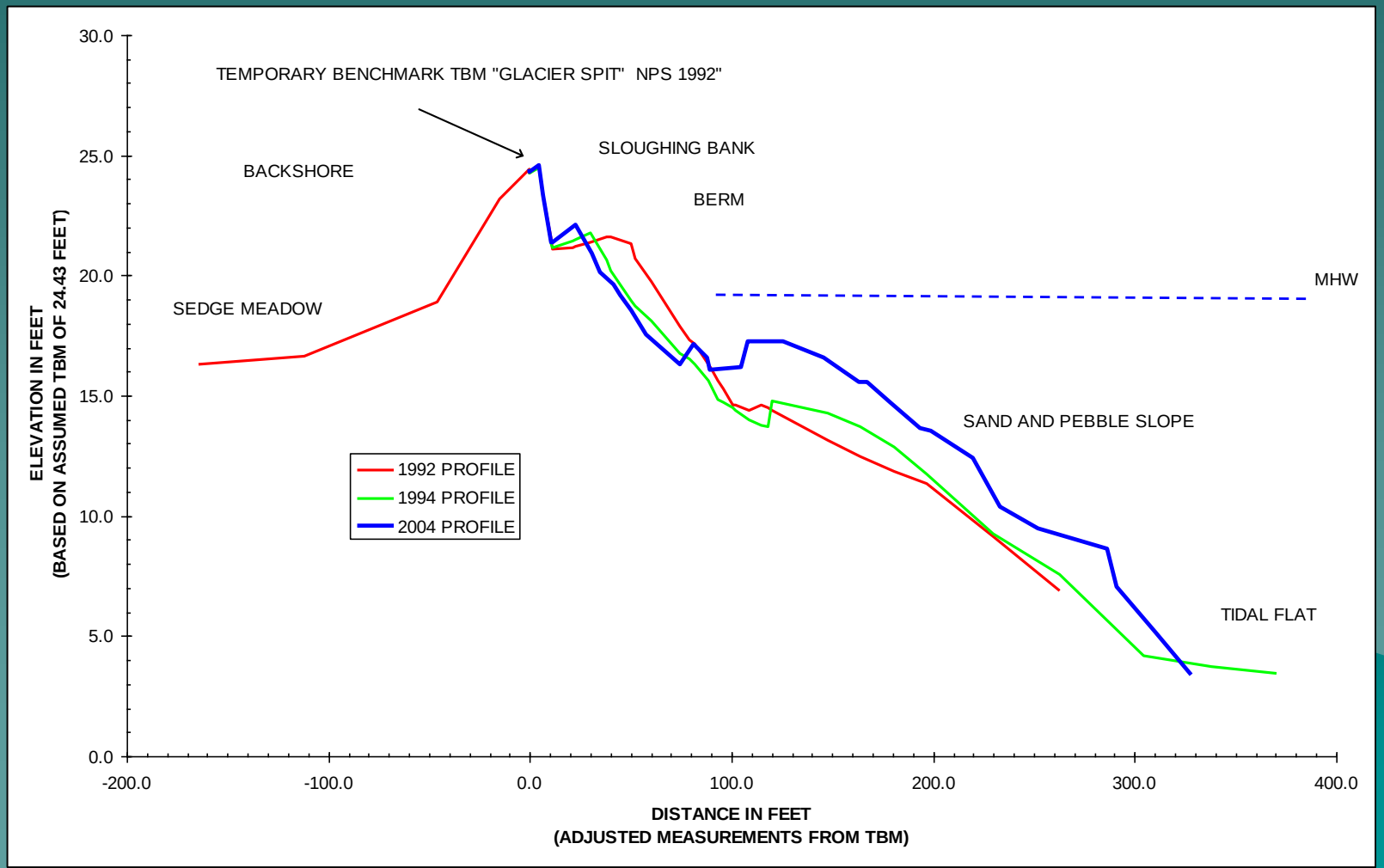


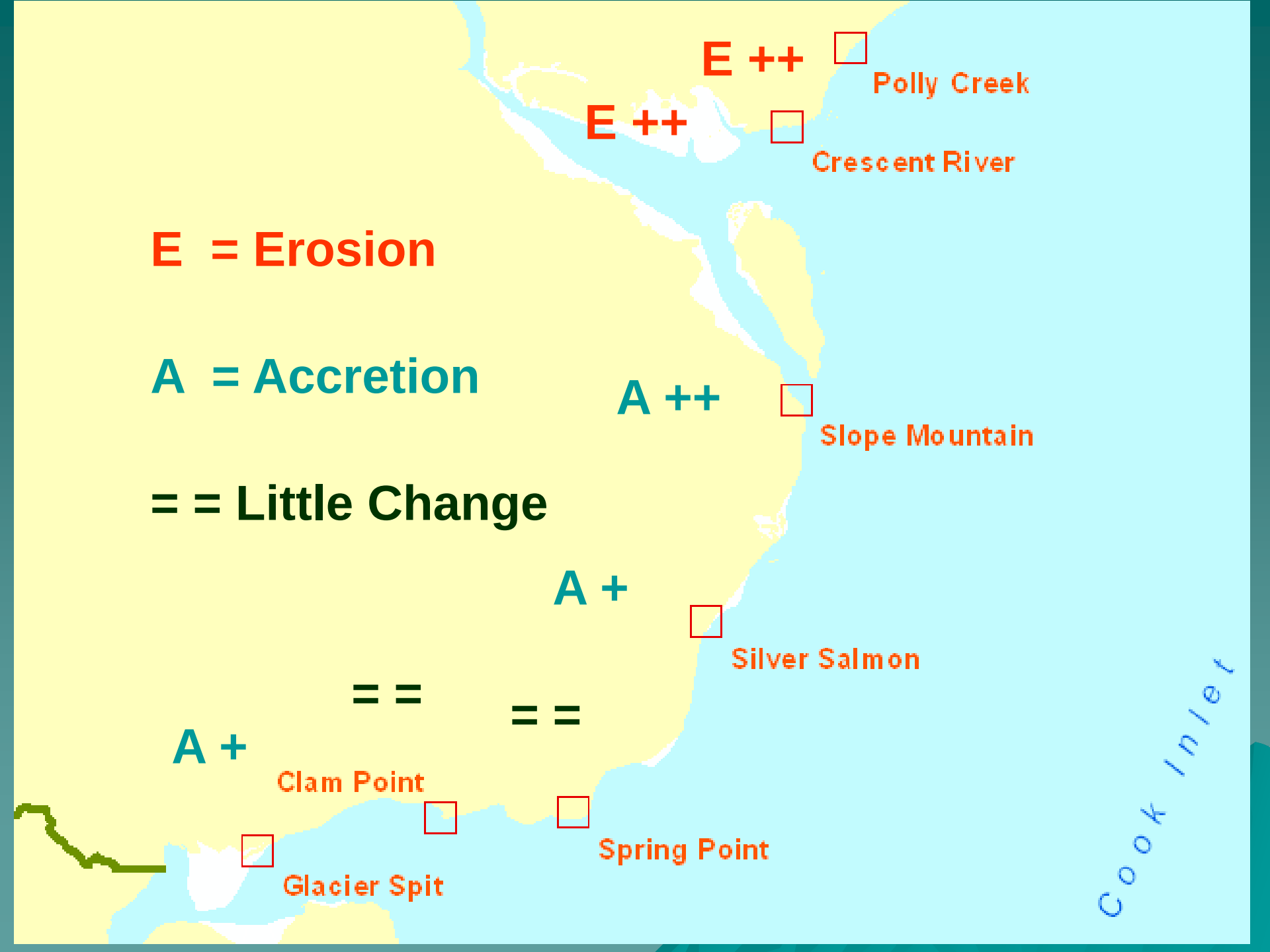
Key Findings

Glacier Spit

Glacier Spit

- Accretion ~ 1 meter




E ++
Polly Creek
E ++
Crescent River
E = Erosion
A = Accretion
A ++
Slope Mountain
= = Little Change
A +
Silver Salmon
= =
= =
A +
Clam Point
Spring Point
Glacier Spit
Cook Inlet

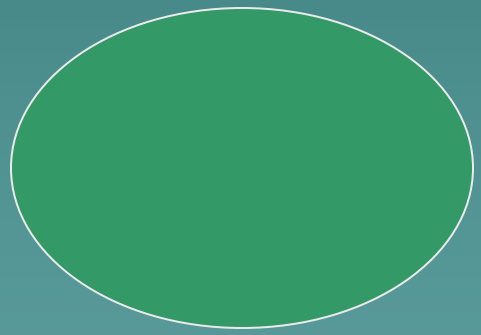
Objectives

- Coastal Lake Clark Classification
- Beach Profile Methods
- Key Findings
- Future Recommendations

Future Recommendations

- Move Survey Markers at Risk

Alan Bennett does battle with
a Metal detector



Survey Markers at Risk

- High Risk of Losing
  - **Crescent River**
    Polly Creek
- Lower Risk of Losing
  - **Slope Mountain**
  - **Silver Salmon**

- While were at it…Recover the other 3 sites along coast

Future Recommendations

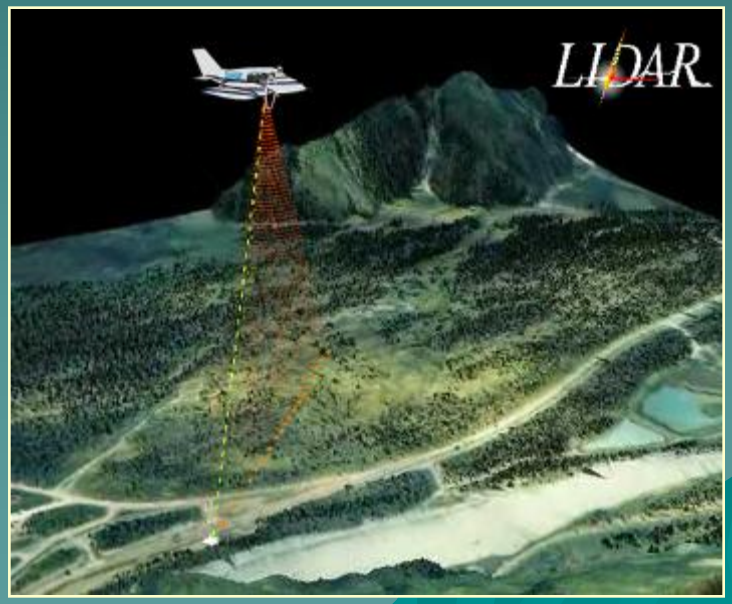
- Move Survey Markers at Risk
- Measuring Change - Alternatives

Beach Surveying Techniques

- Rod and Transit
- LIDAR

Vertical: +/- 0.1 m

Horizontal: 0.5 m



Vertical: +/- .15 m

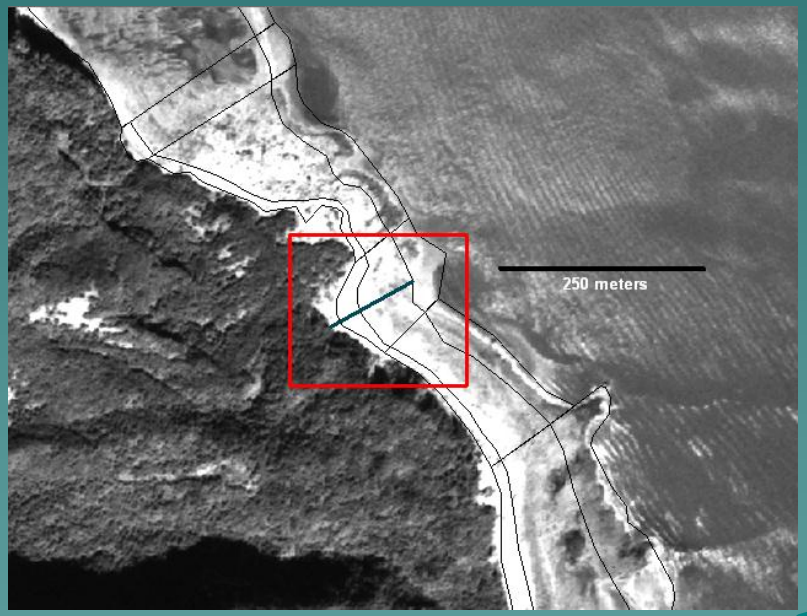
Horizontal: .1 m

Beach Surveying Techniques

- Rod and Transit
- LIDAR

- Aerial Photography

Basic



1:24,000 to 1:12,000

Beach Surveying Techniques

- Rod and Transit
- LIDAR

- Mapping Grade GPS
- XY mapping of coastal features

Rapid Easy

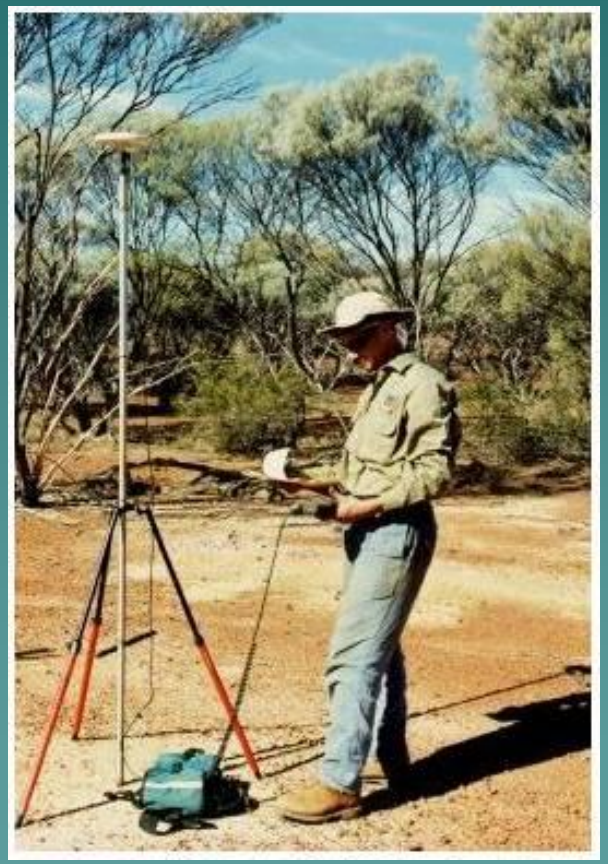
Vertical: +/- 2 m

Horizontal: 0.5 – 1m

Mark Duffy has protocols in place

Beach Surveying Techniques

- Rod and Transit
- LIDAR



- RTK GPS
- XYZ Profiling

Survey Quality

Vertical: +/- 0.2 m

Horizontal: 0.1 m

http://www.pobonline.com/CDA/ArticleInformation/Article/1,9169,15029,00.html

Future Recommendations

- Move Survey Markers at Risk
- Measuring Change – Alternatives
- Permanent photo points
- Monumentation and GPS is key
- To Archive is to Have

Summary

- Rod and Transit surveys provide a simple, cost effective means of measuring general beach trends
- Returning to a Legacy Dataset requires Archiving skills

Acknowledgments

- Alan Bennett
- William Driskell
- Carl Schoch
- Judy Putera
- Silver Salmon Creek Lodge